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Perfectionism, burnout, and depressive symptoms in youth soccer players: Moderation by empowering and disempowering climates

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Abstract

Youth soccer players face considerable pressure as they pursue a successful career in the sport. Research shows that some players navigate these pressures better than others, with the immediate coaching environment also playing a key role. The aim of the current study was to (1) examine the relationship between different perfectionism subtypes and burnout and depressive symptoms in youth soccer players, and (2) examine if perceptions of empowering and disempowering climate moderated these relationships. Two-hundred and sixty-six youth male soccer academy players completed measures of perfectionism, burnout, depressive symptoms, and empowering and disempowering climate. Moderated regression analyses typically supported the hypotheses of the 2 x 2 model and differentiated between subtypes for burnout and depressive symptoms. A more empowering climate also decreased one aspect of burnout – devaluation - in three of four subtypes. The findings show that some perfectionism subtypes are associated with higher burnout and depressive symptoms in youth soccer, and an empowering climate might help reduce burnout for most subtypes.

Keywords: wellbeing, motivation, performance

Soccer academies aim to recruit and train the best young players in the hope of producing some of the very few who have a career in the sport. Reflective of the rarity and value of these players, those within the academy system are regularly transferred between clubs for hundreds of thousands of dollars and sometimes even millions of dollars. Understandably, the environment can be extremely competitive, with research providing powerful accounts from players of the challenges and difficulties of being part of a soccer academy (see Hem et al., 2022; McGlinchey et al., 2022; Rongen et al., 2021). This environment, and concerns regarding the toll it can take on some players, is the backdrop for the current study and our aim of examining how being more or less perfectionistic in this setting corresponds with higher or lower burnout and depressive symptoms. To fulfil our aim, we compare different perfectionism subtypes to identify those with the highest and lowest levels of these mental health related issues. Thereafter, with the intention of identifying factors that may help attenuate these relationships, we also examine whether the degree to which the context is experienced as empowering or disempowering moderates the relationship between perfectionism subtypes and these outcomes.

Burnout and Depressive Symptoms

Athlete burnout includes three core dimensions (Raedeke, 1997; Raedeke & Smith, 2001). A reduced sense of accomplishment is an athlete's perception that they are not reaching their goals and are consistently performing below their capabilities. Physical and emotional exhaustion is a sense of depleted resources - athletes feel drained from participation and have difficulty recovering any sense of vitality. Finally, sport devaluation is an athlete's diminished personal interest in sport participation and their performance. Burnout is evident when stressful experiences become chronic, and burnout develops to greater degrees, endures over time, and contributes to performance and mental health difficulties (Gustafsson et al., 2017). Attempts to estimate the prevalence of burnout in soccer

are hampered by the lack of clear cut-off values but suggest that typically 7.1% of samples report experiencing burnout "*sometimes"* and less than 1% report experiencing burnout "*frequently"* (Smith et al., 2020). However, estimates can be much higher in some samples and for some dimensions. Notably, in one study of soccer academies, 25.78% of the players reported experiencing exhaustion "*sometimes*" and 4.47% "*frequently*" (Adie et al., 2012).

Burnout is intertwined with depressive symptoms (see Bianchi et al., 2015). Depressive symptoms can include depressed mood, loss of interest or pleasure, fatigue, sleep problems, guilt, poor concentration, and suicidality (Kennedy, 2008). Underlying these symptoms are the presence of negative emotion (negative affect), absence of positive emotion (anhedonia), and a cluster of physical symptoms (somatization) (Carleton et al., 2013). Depressive symptoms are part of the development of depression and the complex interaction between the environment, personal characteristics, and pre-disposing factors that give rise to it (see Beck & Bredemeier, 2016). Depressive symptoms are, though, more common than depressive disorders and people can experience them without meeting formal diagnostic criteria for a depressive disorder (Judd et al., 2002). In terms of how common depressive symptoms are in a soccer academy context, a recent review by Sarmento et al (2021) of research examining depressive symptoms in soccer players, generally, included one study in this context and provided worrying estimates of 24% for mild-to-moderate symptoms and 11% for severe symptoms (Smith et al., 2018).

Multidimensional Perfectionism

The current study builds on research that links burnout and depressive symptoms to perfectionism in youth soccer players. Perfectionism is a personality trait of unrealistically high standards and overly critical evaluation (Frost et al., 1990). As part of a higher-order model of perfectionism focus is placed on perfectionistic strivings/personal standards perfectionism (PSP) and perfectionistic concerns/evaluative concerns perfectionism (ECP). The former includes "aspects of perfectionism associated with self-oriented striving for

perfection and the setting of very high personal performance standards" (Gotwals et al., 2012, p. 264). The latter includes "aspects associated with concerns over making mistakes, fear of negative social evaluation, feelings of discrepancy between one's expectations and performance, and negative reactions to imperfection" (Gotwals et al., 2012, p. 264). Using this approach, indicators of PSP and ECP are measured, and their effects are examined separately or in combination with one another (see Hill et al., 2018, for a review).

Research examining how PSP and ECP interact has been especially insightful in revealing the effects of perfectionism for athletes. This is because it has allowed research to examine perfectionism subtypes. To do so, researchers have typically adopted Gaudreau and Thompson's (2010) 2 x 2 model of perfectionism and compared the effects of four subtypes: Pure PSP (high PSP, low ECP), Pure ECP (low PSP, high ECP), mixed perfectionism (high PSP, high ECP) and non-perfectionism (low PSP, low ECP). In the 2 x 2 model, differences between subtypes in propensities for wellbeing were proposed to reflect the configuration of PSP and ECP and differences in the etiological and motivational underpinnings of the subtypes. Four corresponding hypotheses were proposed: Pure PSP can be hypothesized to be healthy (H1a), unhealthy (H1b), or neutral (H1c) compared to non-perfectionism; Pure ECP is hypothesized to be more detrimental than non-perfectionism (H2); mixed perfectionism is hypothesized to be more beneficial than Pure ECP (H3); and mixed perfectionism is hypothesized to be more detrimental than Pure PSP (H4).

Research in sport has generally been supportive of the model and shown how subtypes can be distinguished in the expected manner for a range of outcomes (see Gaudreau, 2023). Important to the current study is work that has examined the model in regard to burnout and depressive symptoms. Four studies have examined the model and burnout (Hill, 2013; Madigan et al., 2016; Waleriańczyk & Stolarski, 2022; Waleriańczyk et al., 2022) and one has done so in a soccer academy setting (Hill, 2013). It is evident in that study that the comparative benefits and problems associated with the different subtypes are observable for

aspiring youth soccer players. Support was found for hypotheses 1a, 2, 3, and 4 (reduced accomplishment), 1c, 2, and 4 (exhaustion), and 1c, 2, and 3 (devaluation). In other words, as expected, Pure ECP was typically the most problematic subtype for youth soccer players and there was mixed, but some, evidence of comparative benefits for youth soccer players displaying Pure PSP and mixed perfectionism.

To date, no studies have examined the 2 x 2 model and depressive symptoms in sport. A small number of studies have examined the separate effects of perfectionism, though, and one of those studies has examined changes in burnout alongside changes in depressive symptoms in soccer academy players (Smith et al., 2018). Using the framework of Gaudreau (2012), the hypotheses of the 2 x 2 model can be tested retrospectively using the main effects. Doing so reveals that, when predicting changes in burnout, support was found for hypothesis 1c (reduced accomplishment) and hypotheses 1c and 2 (exhaustion and devaluation). When predicting changes in depressive symptoms, support was found only for hypotheses 1c. In these regards, then, again, as expected, Pure ECP was typically the most problematic for youth soccer players (vs non-perfectionism) for burnout. However, there was little evidence that youth soccer players who display different subtypes of perfectionism can be distinguished between in regards to depressive symptoms over time.

Moderation of Perfectionistic Subtypes

Based on the notion that some sport environments are healthier than others (see Duda, 2013), we were interested in whether perceptions of the achievement climate moderated the relationships between subtypes and these outcomes. The achievement climate was conceptualized as being experienced as empowering and disempowering by the soccer players. These two concepts are taken from a model of coach-created motivational climates proposed by Duda (2013) that is an amalgam of self-determination theory (Deci & Ryan, 2015) and achievement goal theory (Nicholls, 1984). Empowering climates are those in

which coaches emphasize personal mastery over normative ability (task-involving), give athletes a “voice and a choice” in key decisions (autonomy-supportive), and are caring, empathetic, and value athletes (socially supportive). By contrast, disempowering climates are those in which coaches emphasize normative ability over personal mastery (ego-involving) and impose specific and preconceived views and behaviors via pressure and coercion (controlling).

A substantial amount of evidence attests to the benefits of more empowering and less disempowering climates. This evidence is partly provided by research in sport examining the components of self-determination theory and achievement goal theory (see Harwood et al., 2015; Mossman et al., 2022, for reviews). This includes research linking components of the two climates to burnout in an opposing manner in youth soccer players (e.g., Balageur et al., 2012) and to depressive symptoms in other sport samples (e.g., Bartholomew et al., 2011). Evidence is also provided by studies examining these higher-order climate constructs in sport directly (see Birr et al., 2023, for a review). Of these studies, there is evidence in youth soccer players, for example, that empowering climate is related to higher psychological need satisfaction and intention to continue, and lower intention to dropout, whereas disempowering climate is related to the opposite (Castillo-Jiménez et al., 2022).

With this research in mind, it is possible that a more empowering climate may weaken any undesirable influence of perfectionistic subtypes in the 2 x 2 model and a disempowering climate does the opposite. In addition, this type of climate may also help counter, at least to some degree, the pressures that youth soccer players encounter in this context (e.g., McGlinchey et al., 2022). In support of this possibility, outside of sport, there is evidence that the effects of perfectionism on both burnout and depressive symptoms are subject to moderation by a range of factors (e.g., self-efficacy and quality of friendships; Chang et al., 2016; Zhang & Cai, 2012). There is some indication that this is the case in

sport, too. Of note, directly related to the aims of this study, in a recent test of the 2 x 2 model and burnout in a youth dance context it was found that when perceptions of autonomy support (a component of an empowering climate) were high (vs low) it tempered the association between Pure ECP and burnout (see Jowett et al., 2021). This was evident in changes to support for the hypotheses of the model with Pure ECP no longer associated with higher reduced accomplishment or devaluation than non-perfectionism (H2), or mixed perfectionism (H3), when autonomy support was perceived to be high (vs low).

Present Study

The aim of the current study was to (1) examine the relationship between different perfectionism subtypes and burnout and depressive symptoms in youth soccer players, and (2) examine if perceptions of empowering and disempowering climate moderated these relationships.

In regards to the first aim, the hypotheses of the 2 x 2 model were tested. The first hypothesis was that Pure PSP would be associated with the same level of burnout and depressive symptoms as non-perfectionism (Hypothesis 1c). The second hypothesis was that Pure ECP would be associated with the highest level of burnout and depressive symptoms (Hypothesis 2). The third hypothesis was that mixed perfectionism would be associated with lower burnout and depressive symptoms than Pure ECP (Hypothesis 3). The fourth hypothesis was that mixed perfectionism would be associated with higher burnout and depressive symptoms than Pure PSP (Hypothesis 4).

In regards to the second aim, it was hypothesized that perceptions of an empowering climate would buffer the relationships between perfectionism subtypes and both burnout and depressive symptoms, and that perceptions of a disempowering climate would exacerbate the relationships between perfectionism subtypes and both burnout and depressive symptoms. To examine this possibility, the hypotheses of the 2 x 2 model were retested, and we compared

levels of burnout and depressive symptoms associated with perfectionism subtypes when climate scores were high and low.

Method

Participants and Procedure

Youth male soccer players (N = 274) were recruited from professional soccer academies in England. Following preliminary analysis (see section below), the final sample was 266 players with an average age of 16.19 years (SD = 1.78, range 14 to 21). On average, Players reported that they had joined the academy at 11.11 years old (SD = 3.23), had been at the club for 4.44 years (SD = 3.40), and trained 13.08 hours per week (SD = 9.39). Eight-eight percent of the players (n = 241) had been at the academy for at least 1 year. They also rated their participation in soccer as extremely important in comparison to other activities they take part in (M = 9.55, SD = 1.01, 1 = not at all important to 10 = extremely important).

No a priori power analysis was conducted. Sample size was determined by success of recruitment over a period of approximately six months (one competitive season). As points of reference, interaction effects of perfectionism in sport range from $\Delta R^2 < .010$ to .046 (e.g., Crocker et al., 2014; Gaudreau & Verner-Filion, 2012; Madigan et al., 2016) and the detection of typical interaction effects require samples between 152 and 256 in hierarchical regression analysis (ΔR^2 .03 to .05; $\alpha = .05$, power = .80, tested predictors = 1, total predictors = 3; see Hill et al., 2021). A three-way interaction of a similar size ($\Delta R^2 = .01$ to .04) was recently found when examining perfectionism, climate and burnout (Jowett et al, 2021). In these regards, the current sample size would be considered larger than typical and allows detection of interaction effects when $\Delta R^2 \geq .02$ ($\alpha = .05$; power = .80).

The study was granted ethical approval. Soccer academies were contacted with information about the study and to obtain their permission to approach their players to participate. Thereafter, players received information about the study. For youth soccer players under the age of 18, an opt-out approach to parental consent was adopted. All

participants completed an informed consent form. Questionnaires were distributed in a training session. The questionnaires took approximately 20 minutes to complete and all participants received a debrief form afterwards. The data were collected as part of a doctoral thesis that examined perfectionism and psychological ill-being in soccer (Smith, 2018). Data used in this study have not previously been published elsewhere and are not publicly available, as consent was not sought to do so from participants and clubs when data were collected and as part of gaining ethical approval for the project. Data will be made available for the purpose of verifying the findings on reasonable request.

Measures

Perfectionism. The Multidimensional Perfectionism Scale (HF-MPS; Hewitt & Flett, 1991) was administered to measure self-oriented perfectionism (as an indicator of PSP) and socially prescribed perfectionism (as an indicator of ECP) (the other-oriented perfectionism subscale was excluded). Based on assessment of the psychometric properties of this instrument (see preliminary analyses section), the brief version developed by Cox et al. (2002) was used. The brief HF-MPS contains five items to assess self-oriented perfectionism (e.g., "I am perfectionistic in setting my goals") and five items to assess socially prescribed perfectionism (e.g., "I feel that people are too demanding of me") with responses given on a seven-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). The stem was adapted to focus on soccer participation (e.g., "In soccer [football]…"). Evidence to support the validity and reliability of scores when using the brief version has been provided by Cox et al. (2002), in particular, how it outperforms the longer version in regard to its psychometric proprieties. It has also been used in similar samples to the current study (e.g., Hill, 2013).

Burnout. The Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001) was used to measure burnout. The ABQ includes three subscales that assesses each dimension of burnout: reduced sense of accomplishment (5-items; e.g., "I am not achieving much in soccer [football]"), emotional and physical exhaustion (5-items; e.g., "I am exhausted by the mental

and physical demands of soccer [football]"), and sport devaluation (5-items; e.g., "The effort I spend in soccer [football] would be better spent doing other things"). Responses are on a five-point Likert scale (1 = *almost never* to 5 = *almost always*). Evidence to support the validity and reliability of scores when using this instrument has been provided by Raedeke and Smith (2001) and its use in similar samples (e.g., Donachie et al., 2019).

Depressive Symptoms. The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) was administered to measure depressive symptoms. Based on assessment of the psychometric properties of this instrument (see preliminary analyses section), the three factor 14-item version developed by Carleton et al. (2013) was used. This includes subscales that measure somatic symptoms (6-items; e.g., "My sleep was reckless"), negative affect (4-items; e.g., "I felt depressed"), and anhedonia (4-items; e.g., "I felt depressed"). Responses are on a four-point Likert scale (0 = *rarely or none of the time* to 3 = *most or all of the time*). The CES-D has been used in similar adolescent samples to measure depressive symptoms and has provided evidence to support the validity and reliability of scores (e.g., Smith et al., 2018).

Motivational Climate. The Empowering and Disempowering Motivational Climate Questionnaire-Coach (EDMCQ-C; Appleton et al., 2016) was administered to assess the coach-created climate. In assessing the psychometric proprieties of the instrument, a briefer, two factor, version of the EDMCQ proposed by Solstad et al. (2020) was used. This version has 19-items that measure empowering climate (11-items; e.g., "My coach tried to make sure players felt good when they tried their best") and disempowering climate (8-items; e.g., "My coach shouts at players in front of others to make them do certain things"). Responses are on a five- point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). Evidence to support the validity and reliability of scores when using this instrument has been provided by Sostad et al. (2020).

Statistical Analyses

The recommendations of Gaudreau (2012; Gaudreau & Thompson, 2010) were followed to test the hypotheses of the 2 × 2 model of perfectionism. First a regression was performed to establish whether the interaction term (PSP*ECP) is statistically significant. Centered predictor variables (PSP and ECP) are entered followed by their interaction term (PSP*ECP). If the interaction term was not statistically significant, a separate regression was conducted with only the uncentred predictor variables and interpreted using the Gaudreau's (2012) framework. If the interaction term was statistically significant, two sets of simple slopes were used compare perfectionism subtypes.

The first set of simple slopes tests the relationship between PSP and criterion variable at low (–1 SD) and high (+1 SD) levels of ECP. The first simple slope of this set compares the predicted values of non-perfectionism with Pure PSP (Hypothesis 1). The second simple slope of this set compares the predicted values of Pure ECP and mixed perfectionism (Hypothesis 3). The second set of simple slopes tests the relationship between ECP and criterion variable at low (–1 SD) and high (+1 SD) levels of PSP. The first simple slope of this set compares the predicted values of non-perfectionism with Pure ECP (Hypothesis 2). The second slope of this set compares the predicted values of Pure PSP and mixed perfectionism (Hypothesis 4).

A second series of regressions tested for three-way interactions. This involved regressing centered predictor variables (PSP, ECP, climate), two-way interactions, and three-way interactions on the criterion variable. Simple slopes were again used with the inclusion of low (-1 SD) and high (+1 SD) levels of climate providing a means to test the aforementioned simple slopes and hypotheses when the climate scores were low and high. By respecifying this model, changing the designation of the predictor variables, simple slopes were also estimated for the effect of climate on combinations of PSP and ECP when they were low (-1 SD) and high (+1 SD).

IBM SPSS (version 28.0; IBM Corp, 2021) and Mplus (version 8.1; Muthén & Muthén, 2020) was used for preliminary analyses, descriptive statistics, and correlations. The PROCESS macro for SPSS (version 4.1; Hayes, 2022) was used for moderation analyses, with RStudio (version 2023.03; RStudio, 2023) for main effects models (Hill, 2023), and Excel (version 2108) to graph simple slopes.

Results

Preliminary Analyses

Data were screened prior to analyses to check for errors and missing values (see Tabachnick & Fidell, 2013, for details of this procedure). The frequency of missing data was low with no cases including more than 5% (21 cases included between 1 and 5 missing responses for the variables of interest). Therefore, missing values were replaced with the mean of the available items from the relevant subscale for that individual (Graham et al., 2003).

Next, the psychometric properties of the scales were examined. This included assessment of factor structures using Confirmatory Factor Analysis (CFA) and Exploratory Structural Equation Modelling (ESEM) both with Robust Maximum Likelihood estimation and using target rotation for ESEM. Conventional criteria were used to evaluate fit: χ^2 (df) p >.05, CFI and TLI > .90, RMSEA < .08, 90% CI < .05 to < .08; SRMR < .08, AIC and BIC (smaller indicates better fit in model comparison) (Marsh et al., 2004). All results are reported in full supplementary materials (Table S1 to Table S8).

In assessing the HF-MPS, the 30-item, two factor, model provided inadequate fit (CFA and ESEM) and a number of meaningful cross-loadings, particularly for ECP/SPP (some exceeding loading of target items): CFA - χ^2 (404) = 952.31, p < .001, CFI = .62, TLI = .59, SRMR = .11, RMSEA = .07 (90% CI .07, .08). AIC = 26996.46, BIC = 27325.85; ESEM - χ^2 (376) = 647.13, p < .001, CFI = .81, TLI = .78, SRMR = .05, RMSEA = .05 (90% CI .05, .06), AIC = 26718.86, BIC = 27148.83. Subsequently, a brief version of the scale

proposed by Enns et al. (2002) and included 10-items and two factors was tested. This provided better fit with no issues of cross-loading so was used in the current study: CFA - χ^2 (34) = 75.19, $p < .001$, CFI = .87, TLI = .83, SRMR = .06, RMSEA = .07 (90% CI .05, .09), AIC = 9087.58, BIC = 9199.58; ESEM: χ^2 (26) = 55.40, $p < .001$, CFI = .91, TLI = .84, SRMR = .04, RMSEA = .06 (90% CI .04, .09), AIC = 9082.05, BIC = 9222.96.

Assessment of the ABQ was, overall, more supportive with evidence of inadequate (CFA) and more adequate fit (ESEM). The ESEM provided a small number of cross loadings in the reduced accomplishment subscale, with one marginally exceeding the target loadings. Otherwise, the was strong evidence for factor loadings on target factors. Overall, the fit was considered adequate enough to proceed with the primary analyses: CFA - χ^2 (87) = 266.65, $p < .001$, CFI = .85, TLI = .82, SRMR = .07, RMSEA = .09 (90% CI .08, .10), AIC = 9787.51, BIC = 9960.94. ESEM: χ^2 (63) = 149.81, $p < .001$, CFI = .93, TLI = .88, SRMR = .04, RMSEA = .07 (90% CI .06, .09), AIC = 9693.99, BIC = 9954.14.

For the CES-D, the original 20-item, one-factor, model provided inadequate fit: CFA - χ^2 (170) = 377.89, $p < .001$, CFI = .81, TLI = .79, SRMR = .07, RMSEA = .07 (90% CI .06, .08). Subsequently, a 14-item three factor model proposed by Carleton et al. (2013) was tested and provided adequate fit (CFA and ESEM) with meaningful loadings on target factors and minimal cross-loading. CFA - χ^2 (74) = 98.82, $p = .028$, CFI = .97, TLI = .96, SRMR = .05, RMSEA = .04 (90% CI .01, .05), AIC = 8249.95, BIC = 8412.55; ESEM: χ^2 (52) = 68.59, $p = .06$, CFI = .98, TLI = .96, SRMR = .03, RMSEA = .03 (90% CI .00, .05). Therefore, this version of the instrument was used in the analyses.

Finally, for the EDMCQ-C, using the 34-items, the original two-factor model provided inadequate fit (CFA and ESEM) as did the five-factor model (CFA). The ESEM for the five-factor model also showed patterns of factor loadings that provided weak evidence of the structure and interpretability of three of the subscales (autonomy support, control, and

ego-involving elements): CFA - χ^2 (526) = 1003.07, p < .001, CFI = .85, TLI = .84, SRMR = .06, RMSEA = .06 (90% CI .05, .06), AIC = 22133.69, BIC = 22505.85; ESEM - χ^2 (561) = 3741.53, p <.001, CFI = .86, TLI = .84, SRMR = .05, RMSEA = .06 [90% CI .05, .06], AIC = 22058.02, BIC = 22553.02. Consequently, a 19-item two-factor model proposed by Solstad et al. (2020) was tested and provided more adequate fit (CFA and ESEM) with a small number of cross-loadings but none exceeding target items - CFA: χ^2 (517) = 953.20, p < .001, CFI = .86, TLI = .85, SRMR = .06, RMSEA = .06 (90% CI .05, .06), AIC = 22095.92, BIC = 22500.5; ESEM: χ^2 (401) = 676.09, p <.001, CFI = .91, TLI = .88, SRMR = .04, RMSEA = .05 (90% CI .04, .06), AIC = 21924.05, BIC = 22747.84. There was evidence of local dependency between two items of empowering coaching. Overall, though, the model was superior to the original and was considered suitable for the analyses.

After computing scale scores, eight univariate outliers (z > +/-3.29) and no multivariate outliers were removed (Mahalanobis distance, χ^2 (10) = 29.59, p < .001). Thereafter, some deviation from normality was observed (notably for devaluation and depressive symptoms). The same issues have also been reported by others for burnout and depression in similar settings (e.g., Madigan et al., 2016). As such, in the absence of extreme outliers that had been removed, we continued with the analyses.

Internal consistencies of the subscale scores were checked using Cronbach's alpha and MacDonald's omega (Table 1). All subscale scores displayed adequate consistencies with the exception of ECP, somatic symptoms, and anhedonia which were lower than conventional standards (α / $\Omega \geq .70$). The implications are discussed in the limitations section.

Descriptive Statistics and Bivariate Correlations

Descriptive statistics and bivariate correlations are reported in Table 1. Based on the response format, participants reported high PSP scores and moderate ECP, moderate burnout,

low depressive symptoms, high empowering climate and low disempowering climate. PSP displayed a small and medium negative relationship with burnout and depressive symptoms, a medium positive relationship with empowering climate, and was unrelated to disempowering climate. ECP displayed a medium-to-large positive relationship with burnout and depressive symptoms, and displayed a small negative relationship with empowering climate and a medium positive relationship with disempowering climate. An empowering climate displayed a medium-to-large negative relationship with burnout and depressive symptoms whereas a disempowering climate displayed a medium positive relationship with burnout and depressive symptoms.

Testing the Hypotheses of the 2 × 2 Model

Moderation analyses testing the hypotheses of the 2 × 2 model are presented in Table 2 (as are later tests of the three-way interactions). Corresponding simple slopes and predicted values of perfectionism subtypes (based on main effects and interaction models) are presented in Figure 1. J-N graphs for interaction models are presented in supplementary materials (Figure S1 to Figure S4).

Reduced accomplishment. The interaction model was statistically significant for reduced accomplishment: R^2 =.23, F (3, 262) = 25.36, p <.001. The interaction term was also statistically significant in the model: ΔR^2 =.04, F (3, 262) = 13.39, p < .001. Probing the interaction effect showed that PSP did predict reduced accomplishment at low ECP (B = -0.96 [95% CI = -0.28, -0.02], SE = 0.06, t = -2.31, p = .022) and at high ECP (B = -0.50 [95% CI = -0.63, -0.37], SE = 0.07, t = -7.31, p < .001), and that ECP did predict reduced accomplishment at low PSP (B = 0.34 [95% CI = 0.23, 0.46], SE = 0.06, t = 5.99, p < .001) but not high PSP (B = 0.06 [95% CI = -0.05, 0.16], SE = 0.05, t = 1.09, p = .276). This pattern of effects supported H1a, H2, and H3, but not H4. J-N technique showed that PSP significantly predicted reduced accomplishment when ECP was > 2.50 with 86.09% of the sample reporting above this score.

Exhaustion. The interaction model was statistically significant for exhaustion: R^2 =.14, *F* (3, 262) = 14.25, *p* <.001. The interaction term was also statistically significant in the model: ΔR^2 =.02, *F* (3, 262) = 4.88, *p* = .028. Probing the interaction effect showed that PSP did not predict exhaustion at low ECP (B = -0.05 [95% CI = -0.19, 0.09], SE = 0.07, t = -0.69, *p* = .493) but did at high ECP (B = -0.28 [95% CI = -0.43, -0.14], SE = 0.08, t = -3.74, *p* < .001), and that ECP did predict exhaustion at low PSP (B = 0.34 [95% CI = 0.22, 0.47], SE = 0.06, t = 5.40, *p* < .001) and at high PSP (B = 0.15 [95% CI = 0.04, 0.26], SE = 0.06, t = 2.65, *p* = .009). This pattern of effects supported H1c, H2, H3, and H4. J-N technique showed that PSP significantly predicted exhaustion when ECP was > 3.09 with 65.04% of the sample reporting above this score.

Devaluation. The interaction model was statistically significant for devaluation: R^2 =.24, *F* (3, 2625) = 27.69, *p* <.001. The interaction term was also statistically significant in the model: ΔR^2 =.04, *F* (3, 262) = 13.45, *p* < .001. Probing the interaction effect showed that PSP did predict devaluation at low ECP (B = -0.14 [95% CI = -0.25, -0.02], SE = 0.06, t = -2.25, *p* = .025) and at high ECP (B = -0.46 [95% CI = -0.59, -0.34], SE = 0.06, t = -7.27, *p* < .001), and that ECP did predict devaluation at low PSP (B = 0.35 [95% CI = 0.25, 0.46], SE = 0.05, t = 6.55, *p* < .001) but not at high PSP (B = 0.08 [95% CI = -0.01, 0.18], SE = 0.05, t = 1.72, *p* = .087). This pattern of effects supported H1a, H2, and H3, but not H4. J-N technique showed that PSP significantly predicted devaluation when ECP was > 2.51 with 86.09% of the sample reporting above below this score.

Somatic symptoms. The interaction model was statistically significant for somatic symptoms: R^2 =.19, *F* (3, 262) = 19.85, *p* <.001. However, the interaction term was not statistically significant: B = -0.05 [95% CI -0.13, 0.02], ΔR^2 <.01, *F* (3, 262) = 1.80, *p* = .181. Removing the interaction effect, the main effects model was statistically significant, R^2 =.18, *F* (2, 263) = 28.79, *p* < .001. PSP was a significant negative predictor of somatic symptoms

(B = –0.17 [95% CI = -0.14, -0.004], SE = 0.04, *t* = –2.08, *p* = .038) whereas ECP was a significant positive predictor of somatic symptoms (B = 0.22 [95% CI = -0.16, 0.28], SE = 0.03, *t* = 7.51, *p* < .001). This pattern of main effects supported for H1a, H2, H3, and H4.

Negative affect. The interaction model was statistically significant for negative affect: R^2 =.17, *F* (3, 262) = 18.35, *p* <.001. The interaction term was also statistically significant in the model: ΔR^2 =.02, *F* (3, 262) = 6.59, *p* = .011. Probing the interaction effect showed that PSP did not predict negative affect at low ECP (B = 0.05 [95% CI = -0.07, 0.15], SE = 0.05, t = -0.76, *p* = .449) but did at high ECP (B = -0.16 [95% CI = -0.28, -0.05], SE = 0.06, t = -2.87, *p* = .004), and that ECP did predict negative affect at low PSP (B = 0.31 [95% CI = 0.22, 0.41], SE = 0.05, t = 6.51, *p* < .001) and at high PSP (B = 0.14 [95% CI = 0.06, 0.23], SE = 0.04, t = 3.33, *p* = .001). This pattern of effects supported for H1c, H2, H3, and H4. J-N technique showed that PSP significantly predicted negative affect when ECP was > 3.70 with 40.60% of the sample reporting above this score.

Anhedonia. The interaction model was statistically significant for anhedonia: R^2 =.09, *F* (3, 262) = 8.68, *p* <.001. However, the interaction term was not statistically significant: B = -0.08 [95% CI -0.16, 0.01], ΔR^2 =.01, *F* (3, 262) = 2.83, *p* = .094. Removing the interaction effect, the main effects model was statistically significant, R^2 =.08, *F* (2, 263) = 11.52, *p* < .001. PSP was a significant negative predictor of anhedonia (B = –0.14 [95% CI = -0.23, -0.06], SE = 0.04, *t* = –3.42, *p* < .001) whereas ECP was a significant positive predictor of anhedonia (B = 0.13 [95% CI = 0.06, 0.20], SE = 0.04, *t* = 3.79, *p* < .001). This pattern of main effects supported H1a, H2, H3, and H4.

Testing the Moderating Role of Motivational Climate

Reduced accomplishment. For empowering climate, the three-way interaction model was statistically significant for reduced accomplishment: R^2 = .29, *F* (7, 258) = 15.06, *p* <.001. The three-way interaction term was not statistically significant: ΔR^2 <.01, *F* (1, 258) =

0.35, p = .557. For disempowering climate, the three-way interaction model was statistically significant for reduced accomplishment: R^2 = .26, F (7, 258) = 13.09, p <.001. The three-way interaction term was not statistically significant: B = 0.13 [95% CI -0.10, 0.32], ΔR^2 = .01, F (1, 258) = 3.16, p = .077.

Exhaustion. For empowering climate, the three-way interaction model was statistically significant for exhaustion: R^2 = .17, F (7, 258) = 7.42, p <.001. The three-way interaction term was not statistically significant: B = -0.06 [95% CI -0.26, 0.14], ΔR^2 = .001, F (1, 258) = 0.35, p = .556. For disempowering climate, the three-way interaction model was statistically significant for exhaustion: R^2 = .19, F (7, 258) = 8.37, p <.001. However, the three-way interaction term was not statistically significant: B = -0.02 [95% CI -0.17, 0.14], ΔR^2 <.001, F (1, 258) = 0.04, p = .840.

Devaluation. For empowering climate, the three-way interaction model was statistically significant for devaluation: R^2 = .33, F (7, 258) = 18.49, p <.001. The three-way interaction term was also statistically significant: B = -0.18 [95% CI -0.34, -0.02], ΔR^2 =.01, F (1, 258) = 4.92, p = .027. Probing the interaction effect showed that PSP did predict devaluation at low ECP and low disempowering climate (B = -0.33, [95 CI -0.50, -.16], SE = 0.09, t = -3.80, p < .001) but did not at low ECP and high disempowering climate (B = 0.09 [95 CI -0.06, -0.25], SE = 0.07, t = -1.18, p = .239); PSP did predict devaluation at high ECP and low disempowering climate (B = -0.38 [95% CI -0.53, -0.23], SE = 0.08, t = -5.03, p < .001) and at high ECP and high disempowering climate (B = -0.32 [95% CI -0.50, -0.14], SE = 0.09, t = -3.55, p < .001). In addition, ECP did predict devaluation at low PSP and low disempowering climate (B = 0.27 [95% CI 0.13, 0.40], SE = 0.07, t = 3.97, p < .001) and at low PSP and high disempowering climate (B = 0.36 [96% CI 0.19, 0.54], SE = 0.09, t = 4.13, p < .001); ECP did predict devaluation at high PSP and low disempowering climate (B = 0.221 [95% CI 0.07, 0.37], SE = 0.08, t = 2.86, p = .005) but not at high PSP and high

disempowering climate (B = 0.02 [95% CI -0.08, 0.12], SE = 0.05, t = 0.44, *p* = .661). The pattern of conditional effects supported H1a, H2, H3 and H4 when empowering climate is low and H1c, H2, and H3 (but not H4) when empowering climate is high.

Conditional effects were also examined to determine within subtype differences in devaluation between low and high empowering climate. Doing so showed that empowering climate did predict devaluation at low ECP and low PSP (B = -0.55 [95% CI -0.81, -0.30], SE = 0.13, t = 4.29, *p* < .001); did not predict devaluation at low ECP and high PSP (B = 0.08 [95% CI -0.16, -0.32], SE = 0.12, t = 0.65, *p* = .516); did predict devaluation at high ECP and low PSP (B = -0.37 [95% CI -0.66, -0.09], SE = 0.14, t = -2.57, *p* = .012); and did predict devaluation at high ECP and high PSP (B = 0.28 [95% CI -0.48, -0.08], SE = 0.10, t = 2.77, *p* = .006). The pattern of conditional effects indicated that devaluation was significantly lower for non-perfectionism (1.54 vs 1.05), mixed perfectionism (1.63 vs 1.24), and Pure ECP (2.14 vs 1.75) but not Pure PSP (1.11 vs 1.20) in low vs high empowering climate (as illustrated in Figure 2).

For disempowering climate, the three-way interaction model was statistically significant for exhaustion: R^2 = .29, *F* (7, 258) = 15.41, *p* <.001. The three-way interaction term was not statistically significant: B = 0.08 [95% CI -0.05, 0.21], ΔR^2 =.004, *F* (1, 258) = 1.60, *p* = .209.

Somatic symptoms. For empowering climate, the three-way interaction model was statistically significant for somatic symptoms: R^2 = .23, *F* (7, 258) = 10.77, *p* <.001. The three-way interaction term was not statistically significant: B = -0.02 [95% CI -0.16, 0.11], ΔR^2 <.001, *F* (1, 258) = 0.13, *p* = .721. For disempowering climate, the three-way interaction model was statistically significant for somatic symptoms: R^2 = .22, *F* (7, 258) = 10.10, *p* <.001. However, again, the three-way interaction term was not statistically significant: B = -0.00 [95% CI -0.11, 0.10], ΔR^2 <.001, *F* (1, 258) = 0.01, *p* = .932.

Negative Affect. For empowering climate, the three-way interaction model was statistically significant for negative affect: R^2 = .23, *F* (7, 258) = 10.96, *p* <.001. The three-way interaction term was not statistically significant: B = 0.10 [95% CI -0.05, 0.25], ΔR^2 = .006, *F* (1, 258) = 1.86, *p* = .174. For disempowering climate, the three-way interaction model was statistically significant for negative affect: R^2 = .19, *F* (7, 258) = 8.80, *p* <.001. However, again, the three-way interaction term was not statistically significant: B = -0.05 [95% CI -0.17, 0.06], ΔR^2 =.003, *F* (1, 258) = 0.79, *p* = .374.

Anhedonia. For empowering climate, the three-way interaction model was statistically significant for anhedonia: R^2 = .16, *F* (7, 258) = 6.99, *p* <.001. The three-way interaction term was not statistically significant: ΔR^2 <.001, *F* (1, 258) = 0.19, *p* = .662. For disempowering climate, the three-way interaction model was statistically significant for anhedonia: R^2 = .14, *F* (7, 258) = 5.92, *p* <.001. However, again, the three-way interaction term was not statistically significant: ΔR^2 =.001, *F* (1, 258) = 0.35, *p* = .554.

Discussion

The aim of the current study was to (1) examine the relationship between different subtypes of perfectionism and burnout and depressive symptoms and (2) examine if perceptions of empowering and disempowering climate moderated these relationships. Towards these aims, the hypotheses of the 2 x 2 model in relation to burnout and depressive symptoms were tested. The hypotheses were then retested under conditions of high and low climate scores and corresponding differences in perfectionism subtype scores in burnout and depressive symptoms compared (see Table 3 for a summary).

Testing the 2 x 2 Model of Perfectionism

In the initial test of the hypotheses of the model Hypothesis 1a received mixed support. Pure PSP was associated with lower burnout and depressive symptoms on four (of six) occasions. The two occasions when there was no difference between the two subtypes pertained to exhaustion and negative affect. These findings are similar, though more

extensive, to the only other formal test of the model for burnout in youth soccer players which found benefits of Pure PSP for a sense of accomplishment (Hill, 2013). In departure from the findings of Smith et al. (2018) which examined depressive symptoms in this context, though, subtypes were differentiated in regard to depressive symptoms in the current study. A focus on multiple depressive symptoms in this study may partly explain differences in findings compared to Smith et al. but will need to be explored further. For now, these findings appear to confirm differences between subtypes in regards to burnout and provide the first indication that the comparative benefits of Pure PSP for youth soccer players may also include depressive symptoms.

Most support was found for Hypothesis 2 and Hypothesis 3. Pure ECP was associated with higher levels of burnout and depressive symptoms on all occasions when compared with non-perfectionism. This was also the case when compared with mixed perfectionism. Again, these findings are consistent with previous work in this area (Hill, 2013). In previous work, Hypothesis 2 was supported for all three burnout dimensions and Hypothesis 3 was supported for two of three burnout dimensions (the exception being exhaustion). Where our findings differ to previous work is that the current study provides evidence that, in the same way Pure PSP was comparatively beneficial for depressive symptoms, Pure ECP is also shown to be comparably problematic for depressive symptoms (unlike in Smith et al., 2018). Pure ECP, then, appears to justify its standing as the most problematic subtype within the model and is most associated with elevated risk to burnout for soccer players and depressive symptoms.

Hypothesis 4 received more mixed support. Mixed perfectionism was associated with higher levels of one burnout symptom (exhaustion) than Pure PSP, and higher levels of all depressive symptoms. The findings of previous research have also been quite mixed. Hill (2013) found that mixed perfectionism and Pure PSP could be distinguished between using exhaustion and reduced accomplishment but not devaluation, for example. It appears that while not as problematic as Pure ECP, then, there is at least some evidence of the risks of mixed

perfectionism versus Pure PSP. Notably, in the current study, this pertained mainly to depressive symptoms rather than burnout and mostly likely reflects the higher fears, worries, and anxieties characteristic of the presence of high (vs low) ECP.

Moderating Role of Motivational Climate

When the hypotheses of the 2 x 2 model were retested, one statistically significant three-way interaction emerged for sport devaluation. The analysis suggested that whether the climate was experienced as more or less empowering altered differences between subtypes. Pure PSP and non-perfectionism differed in sports devaluation when empowering climate was low (supporting Hypothesis 1a) but did not differ when it was high (supporting Hypothesis 1c). Similarly, mixed perfectionism and Pure PSP differed in sports devaluation when empowering climate was low (supporting Hypothesis 4) but not when it was high (not supporting Hypothesis 4). In this regard, the findings are similar to those of Jowett et al. (2021) who found differences between subtypes depended on perceptions of autonomy support which mollified Pure ECP (and impacted Hypotheses 2 and 3). Here, the findings allude to the benefits of an empowering climate for two other subtypes – non-perfectionism and mixed perfectionism. For mixed perfectionism, as speculated, this might be explained by the way an empowering climate could ameliorate issues associated with ECP. For non-perfectionism, though, it is less clear as this group is not burdened by such issues. For this finding, it may simply be an indication of the general benefits of this type of climate.

Exploring conditional effects revealed a pattern of changes for almost all subtypes. In addition to mixed perfectionism and non-perfectionism, sport devaluation for Pure ECP was significantly higher when empowering climate was low compared to when empowering climate was high. This is an important finding as this subtype appears most in need of support given its association with the highest levels of burnout. The only subtype to not benefit from an empowering climate was Pure PSP. It is not clear why. If the beneficial

effects of the climate are that it redresses ECP, little change in relation to Pure PSP might be expected. However, the benefit to non-perfectionism appear to contradict this possibility. Qualitative accounts of soccer players in this setting may be informative in this regard. These accounts can vary widely in terms of what players expect from these environments and what they perceive they get in terms of their experiences (see Rongen et al., 2021). Some soccer players seek only professional careers whereas others recognise the wider value and benefits these unique settings can offer (e.g., personal and transferable skills). In the same way, it is possible that perfectionism subtypes differ in their experience of different climates and the degree to which a climate is perceived to be helpful or congruent with their particular needs (see also Mallinson-Howard et al., 2018).

Practical Applications

Given the preliminary nature of the findings, some caution is required prior to practical application. The findings are, though, encouraging in regards to the potential for climate-based interventions to aid perfectionistic youth soccer players. In support of doing so, research suggests that climate-based interventions can be used to train coaches to promote more positive sport experiences, generally (see Bengtsson et al., 2024). Some of this work is in a youth soccer context and adopt similar theoretical frameworks to the current study (e.g., McClaren et al., 2015; Pulido et al., 2017; Pulido et al., 2021). The interventions used in these studies are typically coach-educator guided, supported by educational materials, and short in length (e.g., 12 hours of training), so might easily be implemented within a soccer academy setting as part of coach professional development. In considering the design of interventions of this kind, we encourage practitioners to use this existing work as a starting point for the design of theoretically-informed, evidence-based, programmes to support both soccer academy players wellbeing and athletic development.

Limitations and Future Directions

The study has a number of limitations. First, as a cross-sectional study there is no opportunity to examine temporal ordering and no claims of causality can be made. Second, three of the subscale scores displayed lower levels of reliability. While smaller scales often have scores with lower reliability, regardless, this will have reduced true score variance, and attenuated correlations and statistical power. Caution is required when interpreting the main and interaction effects involving these variables. Third, all instruments were self-report scales that are prone to issues of common method variance and response bias. Although alternative approaches are not common in either perfectionism or burnout research**,** use of other forms of measurement (e.g., coach observations) would help offset some of the concerns around these issues. Fourth, again related to measurement, there is evidence that support for the hypotheses of the 2x2 model can depend on the perfectionism instruments used and this includes when examining burnout (Waleriańczyk et al., 2023). Therefore, it cannot be assumed that the findings apply to other measures of perfectionism. This is also the case in regards to the measures generally where the most reliable scores were provided by alternative versions of the instruments. Finally, for generalizability, future research will need to retest for these interaction effects in other samples to determine the degree to which they are replicable and apply outside of a youth soccer context.

Conclusion

The relationship between perfectionism subtypes and burnout and depressive symptoms in youth soccer players was examined, as well as whether these relationships were moderated by the motivational climate. In support of the 2 x 2 model, perfectionism subtypes could be differentiated with Pure ECP consistently the most problematic. There was also evidence that an empowering climate may decrease sport devaluation for most of the subtypes. Promoting empowering climates may offer one way of protecting youth soccer players from burnout and supporting their pursuit of a career in the sport.

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Table 1. Descriptive Statistics, Bivariate Correlations, and Internal Reliabilities

	1	2	3	4	5	6	7	8	9	10
1. PSP										
2. ECP	.13*									
3. Reduced accomplishment	-.34***	.22***								
4. Exhaustion	-.14*	.30***	.45***							
5. Devaluation	-.33***	.27***	.61***	.50***						
6. Somatic symptoms	-.06	.41***	.42***	.48***	.48***					
7. Negative affect	-.03	.38***	.39***	.35***	.50***	.65***				
8. Anhedonia	-.17**	.20**	.45***	.23***	.33***	.23***	.31***			
9. Empowering climate	.33***	-.09	-.38***	-.24***	-.36***	-.26***	-.26***	.33***		
10. Disempowering climate	-.15*	.22***	.28***	.30***	.31***	.27***	.22***	.29***	-.64***	
M	5.52	3.55	2.17	2.18	1.47	0.67	0.41	0.74	3.95	2.68
SD	0.79	0.96	0.67	0.70	0.63	0.50	0.54	0.56	0.53	0.72
α / Ω	.70 / .69	.62 / .61	.75 / .74	.80 / .80	.79 / .79	.65 / .65	.76 / .77	.63 / .63	.87 / .85	.84 / .88

Note. PSP = Personal standard perfectionism. ECP = Evaluative concerns perfectionism. * $p < .05$, ** $p < .01$, *** $p < .001$, two-tailed.

Table 2. Main and interaction effects of perfectionism on burnout and depressive symptoms

	Reduced accomplishment			Exhaustion			Devaluation			Somatic symptoms			Negative affect			Anhedonia		
	B	SE	t	B	SE	t	B	SE	t	B	SE	t	B	SE	t	B	SE	t
Model 1																		
PSP	-0.32	0.05	-7.00***	-0.17	0.05	-3.24**	-0.30	0.04	-6.94***	-0.08	0.04	-2.15*	-0.06	0.04	-1.59	-0.15	0.04	-3.51***
ECP	0.20	0.04	5.25***	0.25	0.04	5.86***	0.22	0.04	6.10***	0.22	0.03	7.62***	0.23	0.04	7.17***	0.14	0.03	3.96***
PSP*ECP	-0.18	0.05	-3.66***	-0.12	0.05	-2.21*	-0.17	0.05	-3.67***	-0.06	0.04	-1.34	-0.11	0.04	-2.57*	-0.08	0.05	-1.68
Model 2: Emp. Climate																		
PSP	-0.26	0.05	-5.34***	-0.12	0.05	-2.24*	-0.24	0.04	-5.43***	-0.04	0.04	-1.00	-0.01	0.04	-0.16	-0.08	0.04	-1.93
ECP	0.18	0.04	4.69***	0.24	0.04	5.36***	0.22	0.04	6.11***	0.21	0.03	7.02***	0.20	0.03	6.21***	0.11	0.04	3.21***
PSP*ECP	-0.15	0.05	-2.99*	-0.11	0.06	-1.85	-0.12	0.05	-2.60*	-0.03	0.04	-0.74*	-0.07	0.04	-1.59	-0.05	0.05	-1.05*
Emp.Climate	-0.33	0.07	-4.62***	-0.22	0.08	-2.70**	-0.28	0.06	-4.34***	-0.19	0.06	-3.39***	-0.23	0.06	-3.79**	-0.29	0.06	-4.46***
PSP*Emp.Climate	0.05	0.08	0.62	0.01	0.09	0.88	0.23	0.07	3.28***	0.00	0.06	0.02	0.01	0.06	0.15	0.00	0.07	1.00
ECP*Emp.Climate	-0.03	0.08	-0.43	-0.00	0.09	0.97	-0.05	0.08	-0.66	-0.06	0.06	-0.84	-0.14	0.07	-2.18	-0.07	0.07	0.31
PSP*ECP*Emp.Climate	-0.05	0.09	-0.59	-0.06	0.10	0.56	-0.18	0.08	-2.22*	-0.02	0.07	-0.36	0.10	0.07	1.36	0.04	0.08	0.66
Model 3: Dis. Climate																		
PSP	-0.31	0.04	-6.64***	-0.13	0.05	-2.53*	-0.28	0.04	-6.48***	-0.06	0.04	-1.55	-0.04	0.04	-1.02	-0.12	0.04	-2.92***
ECP	0.19	0.04	4.64***	0.20	0.04	4.55***	0.19	0.04	5.17***	0.20	0.03	6.49***	0.20	0.03	5.98***	0.11	0.04	2.97***
PSP*ECP	-0.16	0.05	-3.15**	-0.11	0.06	-1.98*	-0.14	0.05	-2.93**	-0.03	0.04	-0.85	-0.10	0.04	-2.39*	-0.07	0.05	-1.43
Dis.Climate	0.15	0.05	2.86***	0.22	0.06	3.73**	0.18	0.05	3.70***	0.11	0.04	2.70**	0.09	0.04	2.05*	0.17	0.05	3.62***
PSP*Dis.Climate	-0.07	0.03	-1.07	-0.07	0.07	-0.99	-0.15	0.05	-2.52*	0.01	0.05	0.25	0.04	0.05	0.73	-0.05	0.06	-0.94*
ECP*Dis.Climate	-0.03	0.05	-0.61	-0.03	0.06	-0.43	-0.00	0.05	-0.07	0.05	0.04	1.14	0.02	0.05	0.51	-0.03	0.05	-0.68
PSP*ECP*Dis.Climate	0.13	0.07	1.78	-0.02	0.08	-0.20	0.08	0.07	1.26	-0.00	0.05	-0.09	-0.05	0.06	-0.89	0.04	0.06	0.59

Note. B – Unstandardized regression coefficient. SE = Standard Error, t = t-score, PSP = Personal Standards Perfectionism, ECP = Evaluative Concerns Perfectionism, Emp. = Empowering, Dis. = Disempowering. Separate analyses of two-way interactions (PSP*Dis.Climate and PSP*Dis.Cimate) are provided in Supplementary Analysis 1. * $p < .05$, ** $p < .01$, *** $p < .001$, two-tailed.

Table 3. Main and interaction effects for perfectionism on burnout and depressive symptoms

Subtypes comparison	Pure PSP <, >, = non-perfectionism		Pure ECP > non-perfectionism		Pure ECP > Mixed		Mixed > Pure PSP	
Hypotheses	H1a, H1b, H1c		H2		H3		H4	
Simple slope	PSP at low ECP		ECP at high PSP		PSP at high ECP		ECP at low PSP	
Reduced accomplishment	H1a		*		*		ns	
Exhaustion	H1c		*		*		*	
Devaluation	H1a		*		*		ns	
Somatic symptoms	H1a		*		*		*	
Negative affect	H1c		*		*		*	
Anhedonia	H1a		*		*		*	
With…High versus Low Empowering Climate	Low climate	High climate	Low climate	High climate	Low climate	High climate	Low climate	High climate
Devaluation†	H1a	H1c	*	*	*	*	*	ns

Note. PSP = Personal standard perfectionism. ECP = Evaluative concerns perfectionism. * = Hypothesis supported, ns = Hypothesis not supported. † = only three-way interaction (p <.05)

Figure 1. Simple slopes for perfectionism subtypes predicting burnout and depressive symptoms

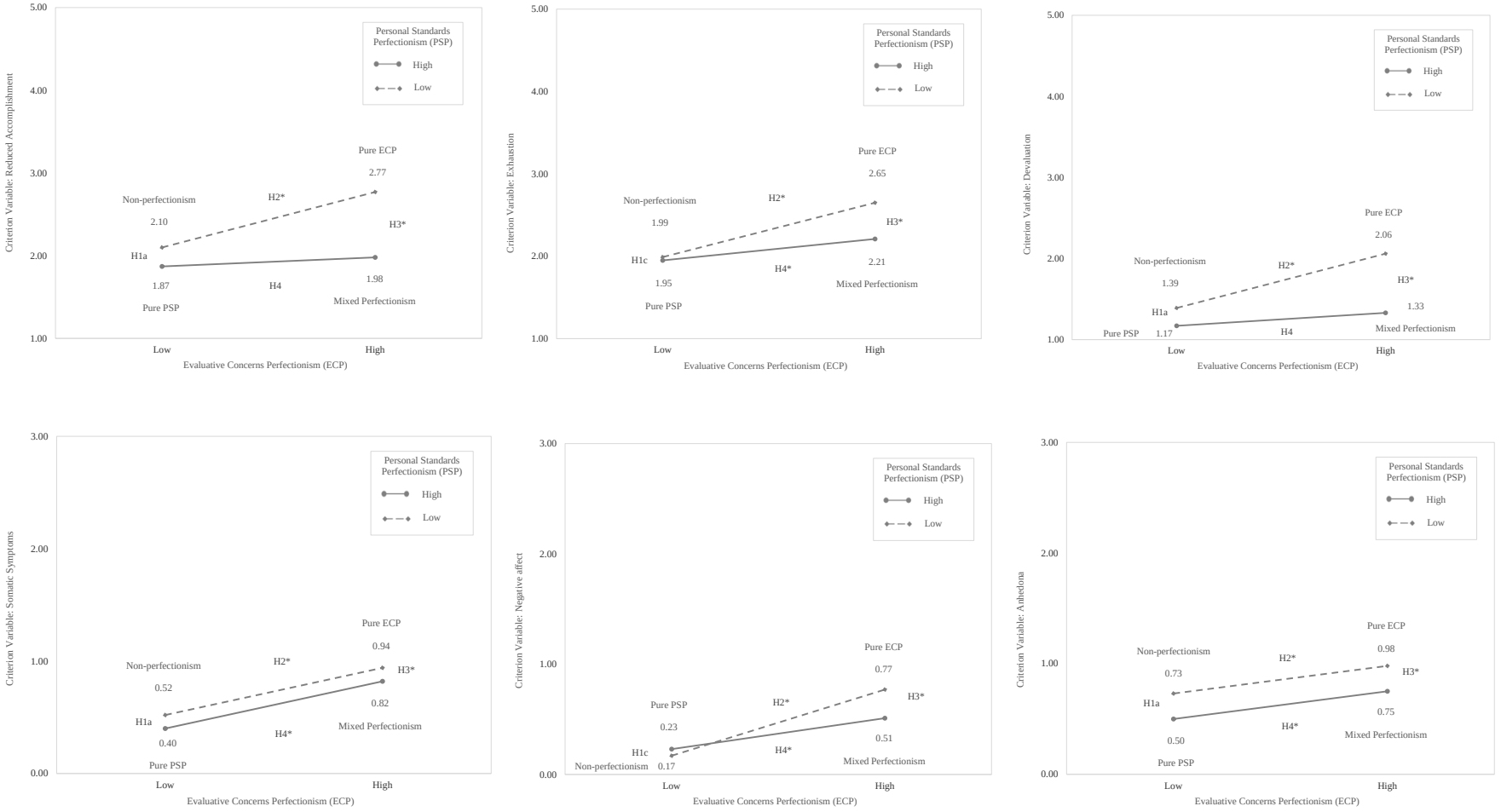


Figure 2. Predicted devaluation for perfectionism subtypes based on empowering climate

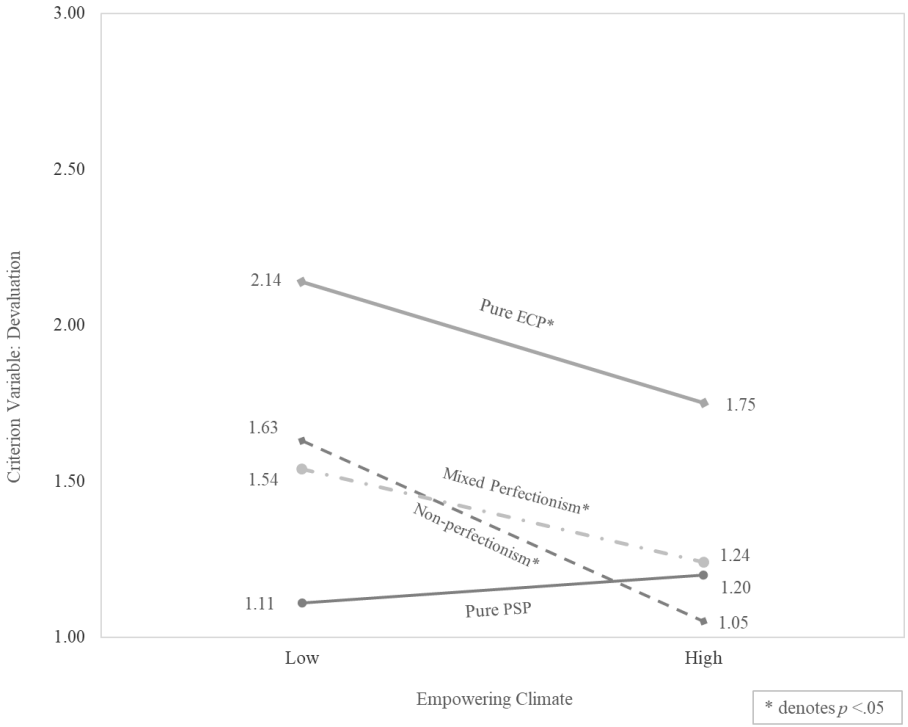


Table S2. Standardised Factor Loadings from CFA and ESEM for the Multidimensional Perfectionism Scale (Two-factors, 30 items)

	CFA		ESEM	
	SOP	SPP	SOP	SPP
1	.49***		**.47*** **	.06
3	.66***		**.61*** **	.17**
4	.33***		**-.34*** **	.14
7	.42***		**.40*** **	.03
9	.61***		**.59*** **	-.00
10	.70***		**.66*** **	.28***
11	.53***		**.58*** **	-.20**
13	.74***		**.70*** **	.29***
15	.12		**.09**	.19*
17	.43***		**.50*** **	.11
20	.39***		**.42*** **	-.07
22	.44***		**.46*** **	-.06
24	.33***		**.43*** **	-.46***
27	.56***		**.63*** **	-.25***
29	.50***		**.53*** **	-.03
2		.11	-.12	**.25** **
5		.28*	-.16	**.33*** **
6		.16	.42***	**-.05**
8		.39***	.13	**.31*** **
12		.51***	.38***	**.34*** **
14		-.28**	.07	**-.32*** **
16		.25**	.24***	**.15**
18		-.12	-.02	**-.10**

19	.34**	-.14	**.40*** **
21	.30***	.02	**.25** **
23	.60***	.17**	**.55*** **
25	-.09	<u>.34***</u>	**-.38*** **
26	.71***	.26***	**.58*** **
28	.27*	-.18**	**.44*** **
30	-.00	<u>-.32***</u>	**.17** **

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; two-tailed. Cross-loadings that exceed .30 are underlined. Bold signals target factor in ESEM. CFA - χ^2 (404) = 952.31, $p < .001$, CFI = .62, TLI = .59, SRMR = .11, RMSEA = .07 [90% CI .07, .08]. AIC = 26996.46, BIC = 27325.85; ESEM: χ^2 (376) = 647.13, $p < .001$, CFI = .81, TLI = .78, SRMR = .05, RMSEA = .05 [90% CI .05, .06], AIC = 26718.86, BIC = 27148.83.

Table S3. Standardised Factor Loadings from CFA and ESEM for the Short-Multidimensional Perfectionism Scale (Two-Factors, 10-items)

	CFA		ESEM	
	SOP	SPP	SOP	SPP
3	.58***		**.54*** **	.13*
17	.55***		**.53*** **	.06
9	.64***		**.64*** **	-.02
27	.52***		**.57*** **	-.15*
29	.59***		**.59*** **	.01
8		.35***	-.02	**.36*** **
19		.34***	-.15*	**.42*** **
21		.34***	-.09	**.36*** **
23		.65***	.04	**.67*** **
26		.70***	.15**	**.61*** **

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; two-tailed. Cross-loadings that exceed .30 are underlined. Bold signals target factor in ESEM. CFA - χ^2 (34) = 75.19, $p < .001$, CFI = .87, TLI = .83, SRMR = .06, RMSEA = .07 [90% CI .05, .09], AIC = 9087.58, BIC = 9199.58; ESEM - χ^2 (26) = 55.40, $p < .001$, CFI = .91, TLI = .84, SRMR = .04, RMSEA = .06 [90% CI .04, .09], AIC = 9082.05, BIC = 9222.96.

Table S4. Standardised Factor Loadings from CFA and ESEM for the Athlete Burnout Questionnaire (three-factors, 15-items)

	CFA			ESEM		
	RA	EE	D	RA	EE	D
1R	.55***			**.33***	-.10	.36**
5	.68***			**.56*****	-.01	.17
7	.68***			**.98*****	.03	-.30***
13	.73***			**.49*****	.30***	.09
14R	.48***			**.47****	-.10	.10
2		.49***		-.11	**.72*****	-.14
4		.66***		-.02	**.76*****	-.04
8		.71***		.27***	**.43*****	.19*
10		.79***		.10	**.66*****	.10
12		.78***		.04	**.64*****	.17*
3			.59***	-.08	.21**	**.53*****
6			.68***	.18*	-.12*	**.63*****
9			.83***	.14	.01	**.83*****
11			.65***	-.02	.09	**.64*****
15			.69***	.12	.15*	**.52*****

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; two-tailed. Cross-loadings that exceed .30 are underlined. CFA - χ^2 (87) = 266.65, $p < .001$, CFI = .85, TLI = .82, SRMR = .07, RMSEA = .09 [90% CI .08, .10], AIC = 9787.51, BIC = 9960.94; ESEM - χ^2 (63) = 149.81, $p < .001$, CFI = .93, TLI = .88, SRMR = .04, RMSEA = .07 [90% CI .06, .09], AIC = 9693.99, BIC = 9954.14.

Table S5. Standardised Factor Loadings from CFA and ESEM for the Original Center for Epidemiologic Studies Depression Scale (one-factor, 20-items)

	CFA
	F1
1	.58***

2	.41***
3	.61***
4	.19**
5	.59***
6	.76***
7	.31***
8	.19**
9	.66***
10	.54***
11	.53***
12	.47***
13	.61***
14	.68***
15	.55***
16	.37***
17	.44***
18	.54***
19	.47***
20	.53***

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; two-tailed. CFA: χ^2 (170) = 377.89, $p < .001$, CFI = .81, TLI = .79, SRMR = .07, RMSEA = .07 [90% CI .06, .08].

Table S6. Standardised Factor Loadings from CFA and ESEM for the Revised Center for Epidemiologic Studies Depression Scale (three factors, 14-items)

	CFA			ESEM		
	SS	NA	A	SS	NA	A

1	.59***		**.62**	-.06	.16
2	.40***		**.30**	.20	-.10
5	.61***		**.31**	.29	.03
7	.30***		**.19**	.24	-.20*
11	.55***		**.41***	.16	-.00
20	.63***		**.51**	.08	.08
3		.63***	.41	**.29**	.01
6		.78***	.05	**.81**	.06
14		.66***	.06	**.58***	.12
18		.62***	.19	**.42***	.09
4R			.35***	-.06	.02	**.40***
8R			.39***	--.21	.15	**.51***
12R			.84***	-.00	.16	**.72***
16R			.68***	.19	-.14	**.71***

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; two-tailed. Cross-loadings that exceed .30 are underlined. Bold signals target factor in ESEM. CFA - χ^2 (74) = 98.82, p = .028, CFI = .97, TLI = .96, SRMR = .05, RMSEA = .04 [90% CI .01, .05], AIC = 8249.95, BIC = 8412.55. ESEM - χ^2 (52) = 68.59, p = .06, CFI = .98, TLI = .96, SRMR = .03, RMSEA = .03 [90% CI .00, .05].

Table S7. Standardised Factor Loadings from CFA and ESEM for the Original Empowering and Disempowering Motivational Climate Questionnaire (Two Factors, 34-items)

	CFA		ESEM	
	EM	DIS	EM	DIS
1	.59***		**.42*****	-.13
4	.72***		**.57*****	-.08

11	.72***		**.58*** **	.05
13	.57***		**.48***** **	.05
18	.62***		**.46*** **	-.02
23	.77***		**.52*** **	-.14*
28	.71***		**.60*** **	-.03
30	.63***		**.57*** **	.05
34	.56***		**.52*** **	.09
3	53***		**.35*** **	-.09
6	.34***		**.31*** **	.04
16	.67***		**.44*** **	-.16*
22	.57***		**.49*** **	.10
32	.51***		**.44*** **	.01
8	.65***		**.53*** **	-.11
14	.66***		**.53*** **	-.04
27	.41***		**.32*** **	-.12
5		.55***	-.01**	**.57*** **
9		.81***	-.04***	**.95*** **
10		.62***	-.08	**.58*** **
19		.78***	.13	**1.03*** **
21		.49***	.11	**.57*** **
25		.63***	-.09	**.60*** **
33		.77***	.02	**.90*** **
2		.50***	.11	**.62*** **
7		.61***	-.16	**.54*** **
12		.74**	-.29***	**.51*** **
15		.07	.30**	**.30* **
17		.68***	-.21**	**.45*** **

20	.23**	-.06	**.17**
24	.53***	-.04	**.52*** **
26	.49***	.00	**.57*** **
29	.07	.19	**.20***
31	.30***	-.05	**.29***

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; two-tailed. Cross-loadings that exceed .30 are underlined. Bold signals target factor in ESEM. Based on modification indices, item 19 and items 2 and 33 have a degree of local dependency in the model that is responsible for the factor loading of item 19 exceeding 1.00. If the item is correlated with these other two items, this issue is resolved (new factor loading is .77 with same or improve fit indices). CFA - $\chi 2$ (526) = 1003.07, p < .001, CFI = .85, TLI = .84, SRMR = .06, RMSEA = .06 [90% CI .05, .06], AIC = 22133.69, BIC = 22505.85. ESEM - $\chi 2$ (561) = 3741.53, p <.001, CFI = .86, TLI = .84, SRMR = .05, RMSEA = .06 [90% CI .05, .06], AIC = 22058.02, BIC = 22553.02.

Table S8. Standardised Factor Loadings from CFA and ESEM for the Original Empowering and Disempowering Motivational Climate Questionnaire (Five Factors, 34-items)

	CFA					ESEM				
	Task	Auto	Supp	Ego	Control	Task	Auto	Supp	Ego	Control
1	.59***					**.39*** **	.11	-.10	-.15	-.09
4	.73***					**.70*** **	.02	-.29**	-.08	-.07
11	.72***					**.74*** **	.10	-.16	-.04	.05
13	.57***					**.58*** **	.03	-.14	.09	-.12
18	.62***					**.28**	<u>.35*</u>	.18	-.11	-.08
23	.77***					**.46** **	.20	.27*	-.25***	-.02
28	.71***					**.59***	.08	<u>.38**</u>	-.00	-.11
30	.64***					**.66*** **	.02	.10	-.06	.10

34	.56***				**.56****	.07	.00	.08	-.06
3		.52***			.31	**.17**	-.05	-.14	-.06
6		.34***			.04	**.45**	-.08	-.12	.02
16		.68***			.33	**.18**	.13	-.12	-.24**
22		.56***			.39*	**.29**	.15	.01	-.03
32		.50***			.29	**.29**	-.06	-.10	-.01
8			.65***		.29	.29	**.05**	-.08	-.23
14			.64***		.42**	.28	**-.15**	-.08	-.13
27			.41***		.16	.25	**.27***	.07	-.33*
5				.53***	-.18	.19	.18	**.26****	.31**
9				.83***	-.01	-.09	-.03	**.71*****	.12
10				.58***	-.24	.20	.09	**.27**	.32**
19				.83***	.15	-.10	.02	**.89*****	.03
21				.48***	.19	-.07	.04	**.32****	.37***
25				.63***	-.12	.02	-.11	**.44*****	.15
33				.81***	-.00	-.04	-.02	**.95*****	-.14*
2					.52***	.02	.18	-.01	.11	**.58*****
7					.64***	.01	-.14	.16*	.18	**.53*****
12					.79***	-.11	-.18	.05	.25**	**.48*****
15					.07	.20	.18	-.10	.07	**.25****
17					.75***	-.01	-.17	-.00	.12	**.65*****
20					.24***	-.01	-.04	-.07	.01	**.25**
24					.48***	-.25	.19	.04	.47***	**-.04**
26					.45***	-.27	.34	-.21	.32*	**.11**
29					.07	.02	.27	-.08	-.10	**.30***
31					.32***	.04	-.04	-.04	-.01	**.39****

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; two-tailed. Cross-loadings that exceed .30 are underlined. Bold signals target factor in ESEM. CFA - χ^2 (517) = 953.20, $p < .001$, CFI = .86, TLI = .85, SRMR = .06, RMSEA = .06 [90% CI .05, .06], AIC = 22095.92, BIC = 22500.59. ESEM - χ^2 (401) = 676.09, $p < .001$, CFI = .91, TLI = .88, SRMR = .04, RMSEA = .05 [90% CI .04, .06], AIC = 21924.05, BIC = 22747.84.

Table S9. Standardised Factor Loadings from CFA and ESEM for the Original Empowering and Disempowering Motivational Climate Questionnaire (Two-factors, 19-items)

	CFA		ESEM	
	EM	DIS	EM	DIS
4	**.72*** **		**.65*** **	-.10
11	**.73*** **		**.77*** **	.05
23	**.76*** **		**.60*** **	-.20
28	**.72*** **		**.73**** **	.01
30	**.64*** **		**.69*** **	.06
34	**.56*** **		**.65*** **	.11
16	**.68*** **		**.57*** **	-.16
22	**.56*** **		**.62*** **	.07
32	**.51*** **		**.47*** **	-.04

8	**.64*** **		**.56*** **	-.12
14	**.64*** **		**.58*** **	-.09
5		**.53*** **	-.08	**.46*** **
9		**.82*** **	-.00	**.81*** **
10		**.57*** **	-.15*	**.44*** **
19		**.82*** **	.22***	**1.02*** †**
33		**.79*** **	.10	**.89*** **
12		**.74*** **	-.32***	**.47*** **
17		**.64*** **	-.34**	**.37*** **
20		**.22** **	-.08	**.16**

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; two-tailed. Cross-loadings that exceed .30 are underlined. Bold signals target factor in ESEM. †Based on modification indices, item 19 and item 33 have a degree of local dependency in the model that is responsible for the factor loading of item 19 exceeding 1.00. If the items are correlated, this issue is resolved (new factor loading is .93 with same or improve fit indices). CFA - χ^2 (151) = 332.30, $p < .001$, CFI = .90, TLI = .89, SRMR = .06, RMSEA = .07 [90% CI .06, .08], AIC = 11846.92, BIC = 12056.48. ESEM - χ^2 (134) = 264.20, $p < .001$, CFI = .93, TLI = .91, SRMR = .04, RMSEA = .06 [90% CI .05, .07], AIC = 11800.34, BIC = 12071.33.

Figure S1. J-N Graph of Personal Standards Perfectionism Predicting Reduced Accomplishment

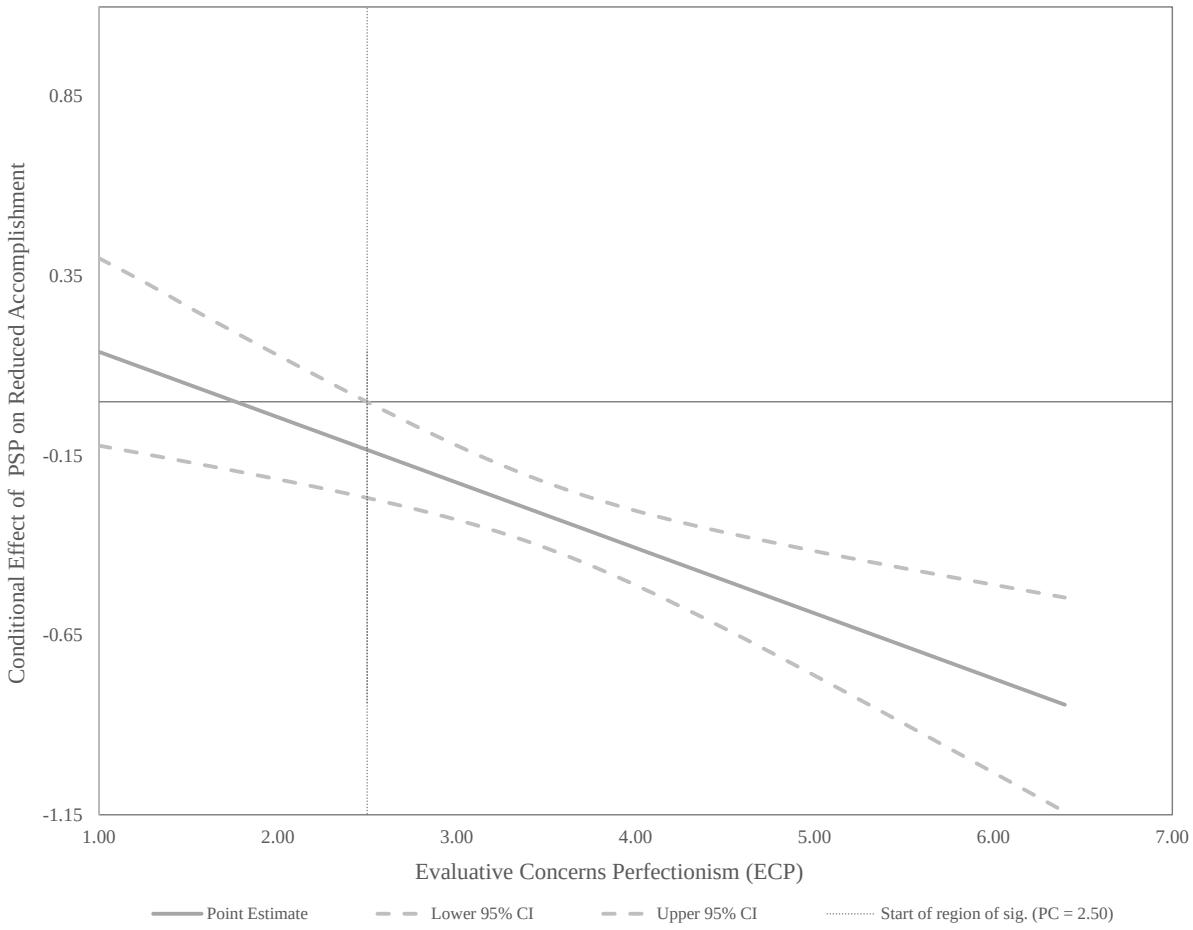


Figure S2. J-N Graph of Personal Standards Perfectionism Predicting Negative Affect

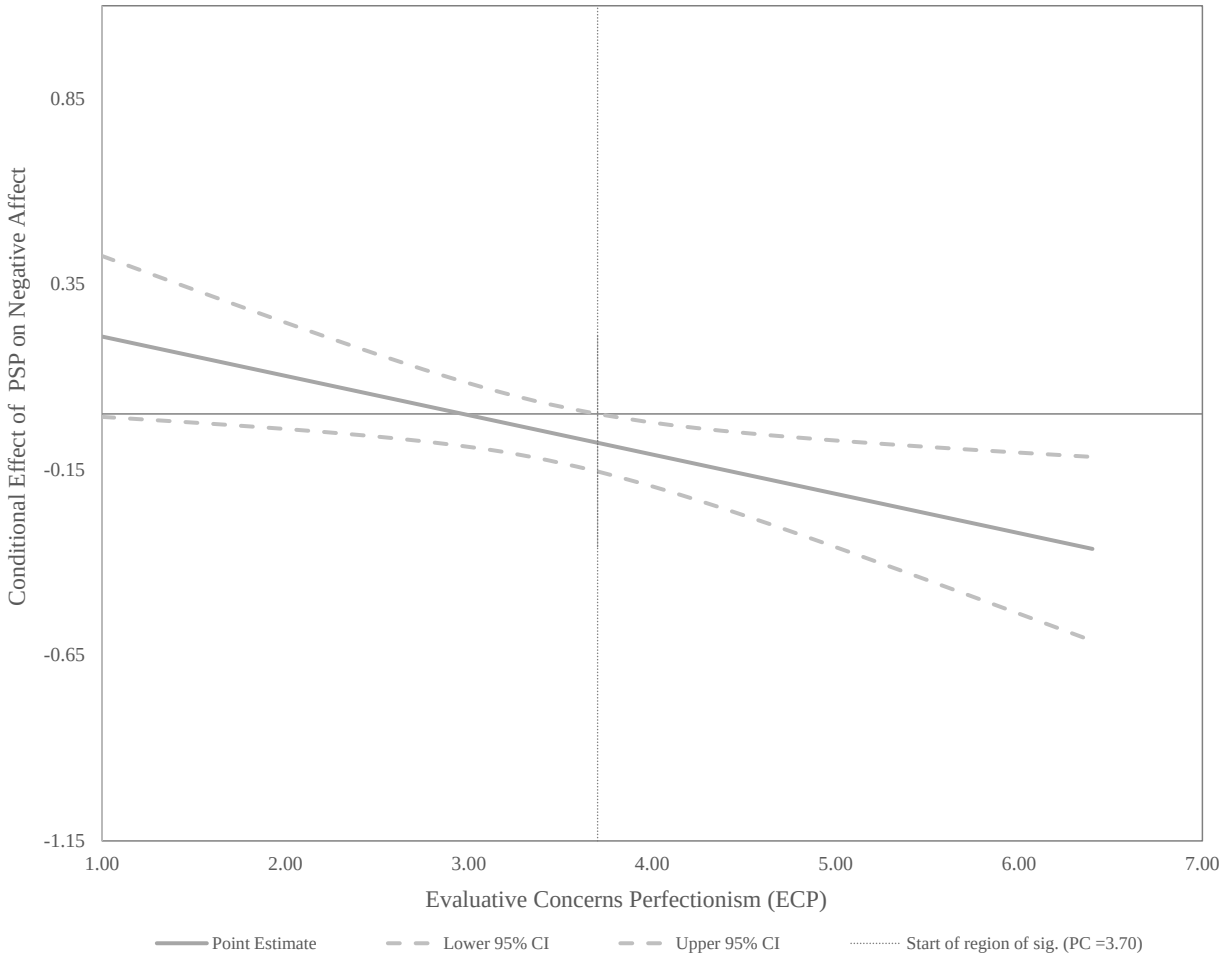


Figure S3. J-N Graph of Personal Standards Perfectionism Predicting Exhaustion

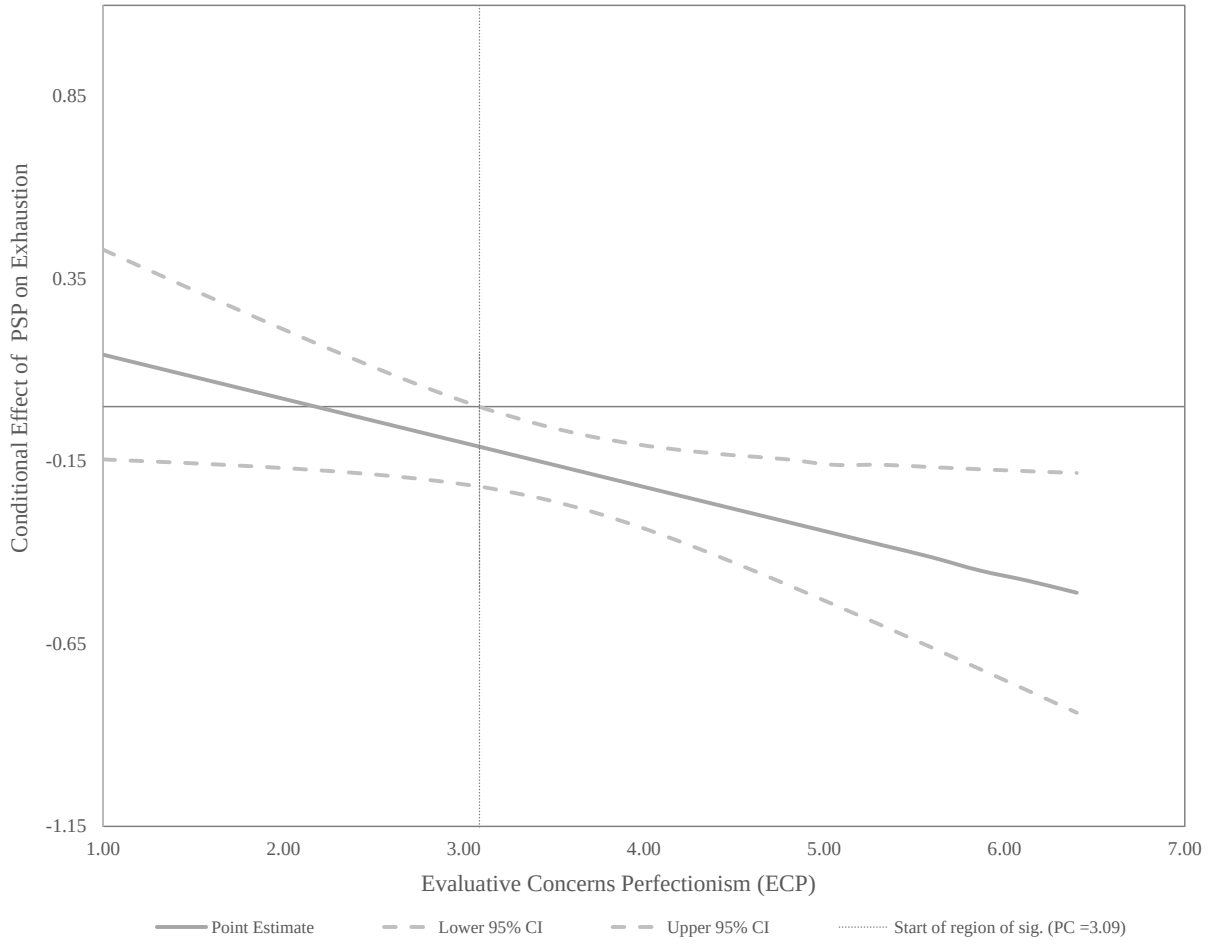
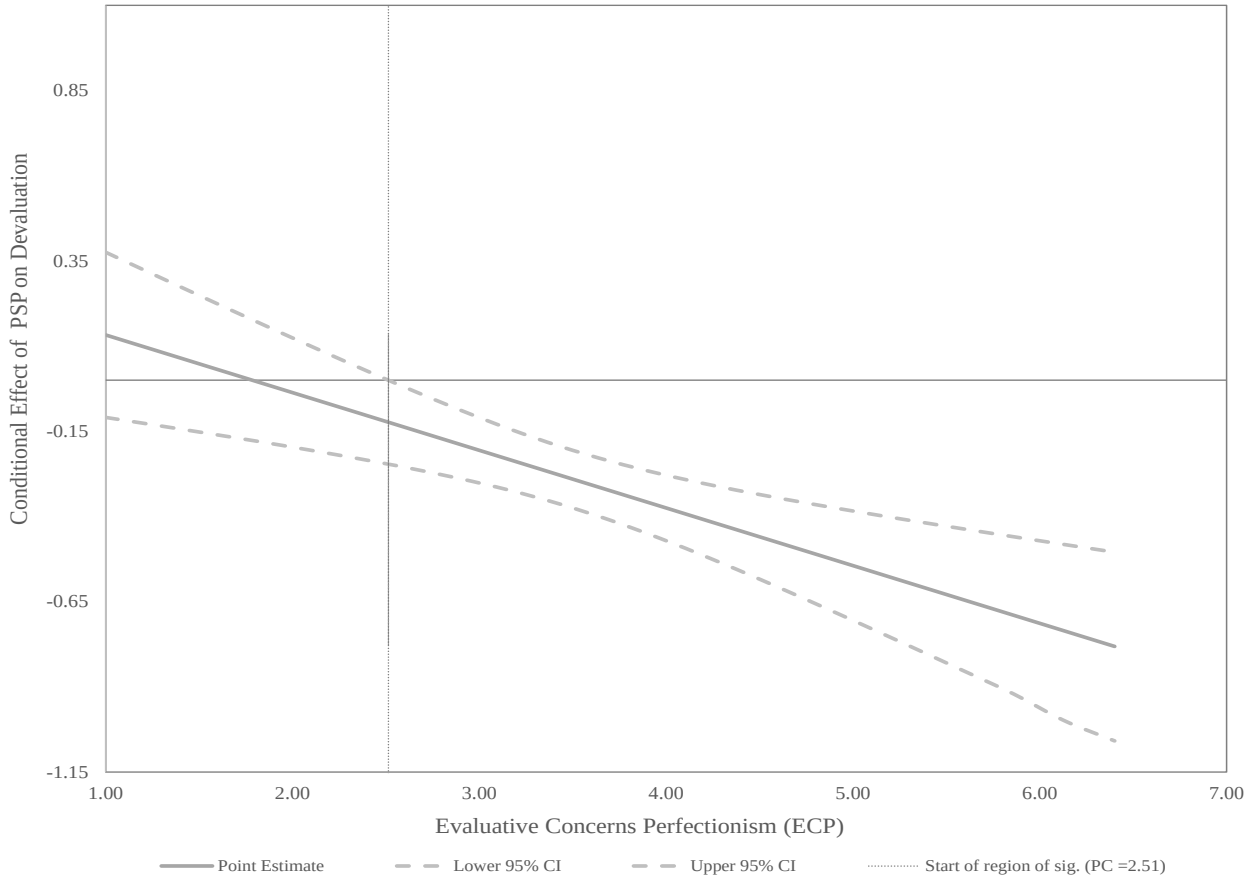


Figure S4. J-N Graphs of Personal Standards Perfectionism Predicting Devaluation

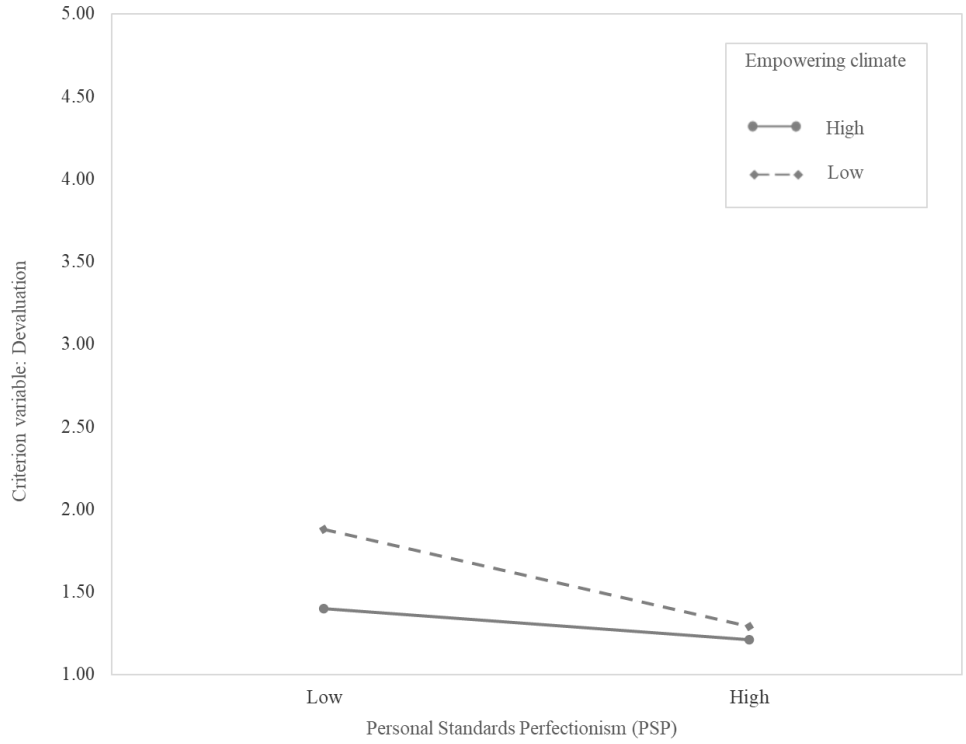


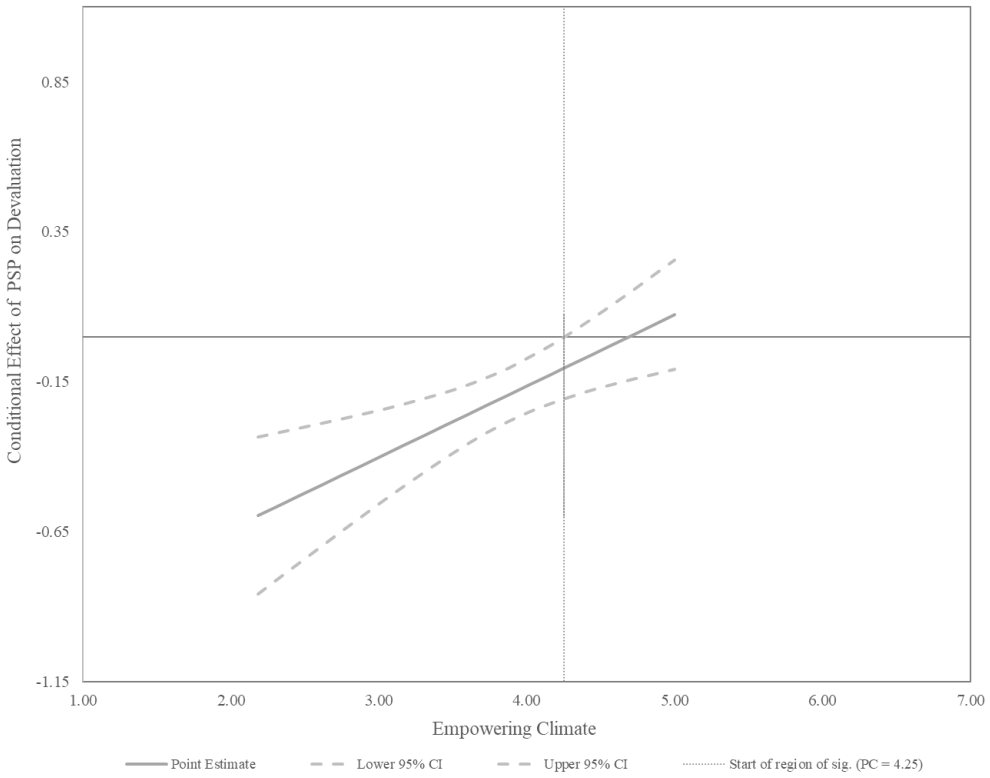
Supplementary Analysis 1.

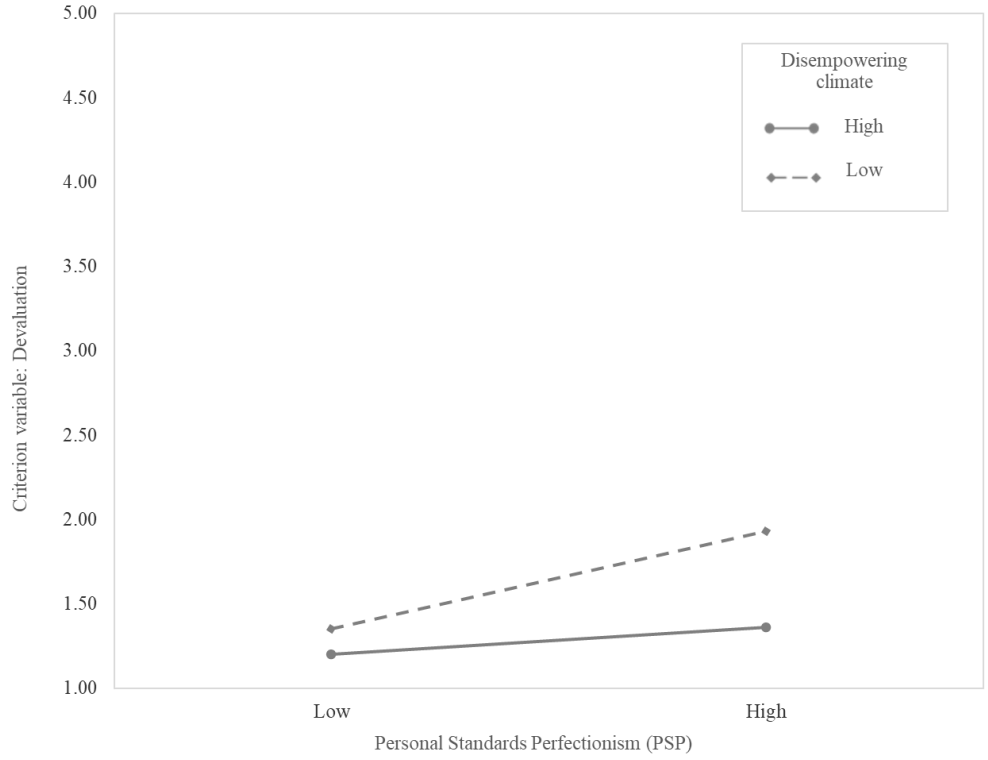
For empowering climate, the two-way interaction model was statistically significant: R^2 = .22, *F* (3, 262) = 24.13, *p* <.001. The two-way interaction term was statistically significant: B = 0.24 [95% CI 0.09, 0.38], ΔR^2 =.03, *F* (1, 262) = 10.55, *p* < .001. Conditional effects showed that PSP predicted devaluation at low empowering climate: B = -0.06 [95% CI -0.41, -0.19], SE = 0.06, *t* = -5.29, *p* < .001, but not at high empowering climate: B = -0.05 [95% CI -0.17, 0.07], SE = 0.06, *t* = -0.81, *p* = .420. Plotting the full range of effects using J-N technique suggested that the effect of PSP on devaluation became statistically significant (*p* < .05) when empowering climate scores exceed 4.25 (corresponding with 25.56% of the sample scores).

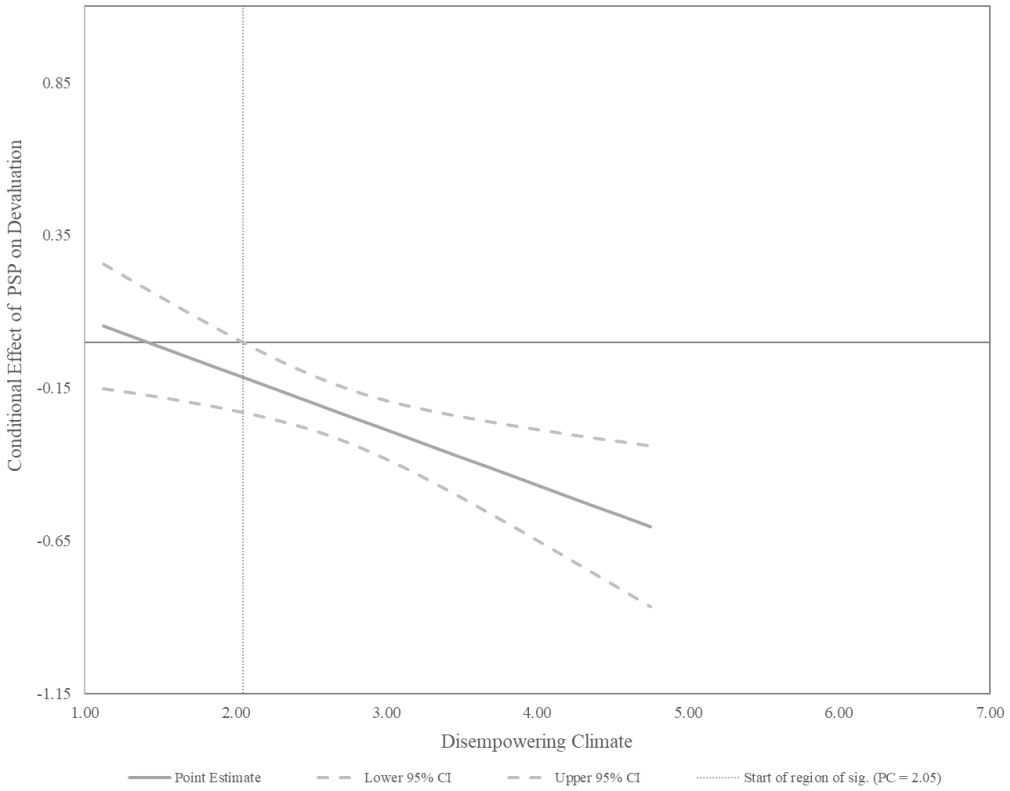
For disempowering climate, the two-way interaction model was statistically significant: R^2 = .20, *F* (3, 262) = 22.13, *p* <.001. The two-way interaction term was statistically significant: B = -0.18 [95% CI -0.30, -0.06], ΔR^2 =.03, *F* (1, 262) = 8.92, *p* <.001. Conditional effects showed that PSP did not predict devaluation at low disempowering climate: B = -0.10 [95% CI -0.22, -0.02], SE = 0.06, *t* = -1.60, *p* = .111, but did at high empowering climate: B = -0.36 [95% CI -0.48, -0.24], SE = 0.06, *t* = -5.73, *p* < .001. Plotting the full range of effects using J-N technique suggested that the effect of PSP on devaluation became statistically significant (*p* < .05) when empowering climate scores exceed 2.05 (corresponding with 79.32% of the sample scores).

Graphs of two-way interaction between PSP and climate in predicting sport devaluation






5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
Criterion variable: Devaluation
Disempowering climate
High
Low
Low
High
Personal Standards Perfectionism (PSP)


0.85
0.35
-0.15
-0.65
-1.15
Conditional Effect of PSP on Devaluation
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Disempowering Climate
Point Estimate
Lower 95% CI
Upper 95% CI
Start of region of sig. (PC = 2.05)

CRediT Author Statement

Andrew P. Hill: Conceptualization, Methodology, Formal analysis, Data curation, Writing - Original Draft, Visualisation, Supervision. **Esmie P. Smith**: Conceptualization, Methodology, Investigation, Writing – Review & Editing, Project Administration. **Howard K. Hall:** Conceptualization, Methodology, Writing – Review & Editing, Supervision.